vessels results in greater rates of flow in the small vessels. Shock loss of energy and friction are increased. Shear at the vessel surface increases. The resulting vascular damage may have acute and chronic effects. Arterial dissection may be the initiating event in a number of acute cardiovascular syndromes, including myocardial infarction, unstable angina, some cerebrovascular syndromes, and rupture of the aorta. Hypertension is itself atherogenic. Possible initiating mechanisms include repeated minor injuries to the vessel wall and release of vasoactive substances as a result of increased shear.[12]

The excess number of coronary events in cold climates may also be related to blood clotting. The plasma concentration of fibrinogen is inversely related to the environmental temperature, but part of the rise in fibrinogen concentrations in the winter may be the result of seasonal respiratory infections.[13,14] The seasonal variations in fibrinogen concentrations due to temperature changes may be half that resulting from smoking.[13] In cold conditions the plasma concentrations of some clotting factors are increased, as are platelet count and in vitro platelet aggregation.[11,13-15] A reduced plasma volume and increased blood viscosity during cold exposure also tend to promote thrombosis.[11,15] Whether these factors have a role in atherogenesis is uncertain. Experiments have produced contradictory results on how environmental temperature affects lipid metabolism, but cold can adversely alter plasma lipid concentrations, making abnormal thrombosis more likely and having a potential chronic atherogenic effect.[14]

All these data suggest that at least part of the excess mortality from cardiovascular diseases in some parts of Britain is due to those areas being relatively cold. For the north to achieve reductions in cardiovascular mortality to the rates present in the warmer south will require greater improvements in other risk factors to compensate for the influence of climate. How far social measures such as improvements in poor heating and home insulation would have an impact on cardiovascular mortality in cold parts of the country is uncertain.

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Health implications of putting value added tax on fuel

Time to combat fuel poverty

The American senator Hubert Humphrey said, "The moral test of government is how that government treats those who are in the dawn of life, the children; those who are in the twilight of life, the elderly; and those who are in the shadows of life—the sick, the needy, and the handicapped." By such criteria, putting value added tax (VAT) on fuel is a bad measure.

Almost three quarters of pensioners in Britain pay no income tax, yet virtually all pay VAT on their gas and electricity bills. Only if the government had added VAT to food or water could it have increased the tax burden for an equivalent number of households made up of elderly people.

The tax burden is not evenly distributed.[1] Although households with low incomes spend less on fuel than those with high incomes (spending on fuel being mainly related to the size of the place where you live), the proportion that they spend is substantially higher—13% in the lowest fifth of income compared with 4% in the highest fifth of income. Households made up of single parents with children aged under 5 or single pensioners spend one sixth of their income on fuel. When households in the top and bottom tenths of income distribution are compared the burden of increased fuel costs due to VAT is seven times greater in poor families.

The term "fuel poverty" was coined in the early 1980s to describe the situation in which people who are least able to afford the cost of heating tend to live in houses that are hardest to heat and, as a result, achieve lower indoor temperatures with the fuel that they buy.[1,2] The high prevalence of dampness and condensation shown by national surveys of the condition of housing—one in five households in England and one in three in Scotland are affected—is largely due to the difficulty of maintaining internal temperatures in poorly designed and insulated houses. In the Glasgow housing condition survey half of families with children were living in houses affected by dampness and condensation.[3]

Low income groups also tend to use dearer fuel because of their lack of access to gas central heating, their greater reliance on electricity and bottled gas, and the extra charges made by power companies for prepayment meters and schemes to "ease" payments.[1] All these problems are accentuated by the colder climate and greater cost of maintaining indoor temperatures in the north of Britain.[4]

Pensioners have a greater need for fuel, given the time they spend at home and the decline of body thermoregulation in old age. Ironically, shops can be closed down in Britain if they do not maintain an internal temperature of 16°C, yet 37% of households made up of elderly people

have winter temperatures below this level.[5] The government has increased benefit payments to pensioners that defray but do not fully compensate for the addition of VAT to fuel costs. No such help has been provided for families with young children on low incomes, whose numbers below the official poverty line have tripled in the past decade.[6]

The immediate effects on health of this policy are likely to be subtle. Prolonged exposure to cold lowers resistance to infection and adversely affects morale and efficiency.[7] Inadequately heated buildings often become damp and predispose to respiratory and rheumatic diseases.[7,8] Restricted use of rooms may lead to overcrowding. Ample pathophysiological evidence links low temperatures to cardiovascular risk (p 1029).[9]

A reduction in disposable income resulting from increased fuel charges is also likely to have effects on health. Policies to improve the national diet are already confounded in poor communities, not by ignorance of a healthy diet but by the extra cost and limited availability of healthier foodstuffs. A study of low income families carried out by the National Children's Home found that mothers often had to choose between food or fuel.[10]

Although the thrust of the government's policy of care in the community concerns the balance of care between primary and secondary sectors, the whole edifice crucially depends on maintaining the current balance between primary care and self care. Most affected families are their own "key workers," making best use of limited resources. The government's Energy Efficiency Office states that groups with special needs may require higher ambient temperatures than the general population.[11] Putting VAT on fuel will reduce disposable income, and make life more difficult, for the army of unpaid carers on whom "care in the community" really depends.

As with many public health issues, the greatest problems arise not with the small numbers of people at high risk but with the large numbers on whom the effects will be small. Thus measures to address individual hardship or extreme weather conditions do not address the problems of large numbers of households with low incomes, above the thresholds for state relief, whose disposable income will be reduced. Like premature death,[12] this is not a problem that will hit the headlines or be reflected soon in routine data but will be suffered quietly by large numbers of people. Public health advocacy is needed to protect these vulnerable groups.

The current policy of putting VAT on fuel should be opposed on principle because it is unfair and will continue the redistribution of wealth from the poor to the rich within Britain. Although other countries in the European Union impose VAT on fuel, they do not have our housing problem, our pronounced seasonal variation in mortality, or our widening range of income distribution.[13]

The greater public health problem is fuel poverty. No mystery concerns its cause or solution. Improved insulation creates warm, dry homes that cost less to heat, thereby increasing the occupant's disposable income.[1] These effects should lead in turn to better health, less cost to health and social services, protection of the environment, and increased spending within local economies. In the furore surrounding the government's imposition of VAT on fuel it is important not to lose sight of this broader, more fundamental aspect of public health policy.

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A new approach to weighted capitation

More sensitive indicators of need but important policy questions remain unanswered

See pp 1046, 1050, 1059

Equity of access to health care on the basis of need alone is the central principle of the NHS. A corollary of this is that resources should be distributed among local health authorities in proportion to their relative health care needs. But this is difficult in practice because population needs cannot be measured directly and the proxies that are available are difficult to interpret.

Since the publication of the report of the Resource Allocation Working Party in 1976,[1] the allocation of resources to hospital and community health services has become progressively more complicated and controversial.[2,3] The review of the Resource Allocation Working Party's formula in 1988, which resulted in the introduction of a weighted capitation formula, was widely criticised.[4,5] Particular concern was expressed about how analyses of variations in hospital use among small areas were used to generate indicators of need.

Prompted by the availability of new data from the census in 1991, the secretary of state for health announced a review of weighted capitation at the beginning of last year. Later this week ministers are expected to publish their conclusions. Although the basis for distributing hospital finances is likely to remain superficially familiar,[6] substantial changes are expected.

Three articles published in this week's journal explain the bulk of the analytical work that informed the review of weighted capitation. They use much more comprehensive data and more sophisticated statistical methods that are better informed by theory than hitherto. Consequently, they are an important contribution to thinking about needs assessment and allocation of resources.

To begin with Carr-Hill *et al* describe an approach to a small area analysis of the determinants of hospital use, which was undertaken to identify population based indi-